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ABSTRACT

This report describes an online minicomputer-based system, one combining library inventory control with catalog access, that was implemented at Virginia Tech's main library in order to meet the demands of increased circulation activity and rising staff costs. Following overviews of the institutional environment, the systems development department, and the library, the history, system objectives, and major functions of the automated circulation and finding system (CFS) are illustrated. CFS procedures related to circulation, data entry, and reference are explained, as well as the system's impacts on administration, management reports, and serials control. Displays of file descriptions, online circulation transactions, online finding transactions, and batch jobs precede a summary of system benefits and a list of references. (PM)

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C I R C U L A T I O N A N D F I N D I N G S Y S T E M

Prepared for the Virginia Governor's Conference on Libraries
and Information Services

Systems Development Department
and
University Libraries

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Virginia Polytechnic Institute & State University

Blacksburg Virginia

March 1979

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1.1 Institutional Environment

Virginia Polytechnic Institute and State University is in the Town of Blacksburg, which is in Montgomery County, Virginia. The campus lies on a plain between the Blue Ridge and Alleghany Mountains, 2,100 feet above sea level. The area is noted for its natural beauty, healthful atmosphere, and outdoor recreational opportunities.

The University grounds cover approximately 2,300 acres. In addition there are about 600 acres of adjoining agricultural research land under long-term lease. The University also owns about 1,300 acres of nearby mountain land and mineral rights on another 1,300 acres.

The school was founded as a land-grant college in 1872 under the name of Virginia Agricultural and Mechanical College. Since then the name has been changed several times. The present one was adopted June 26, 1970. The school is referred to as "VPI", "VIRGINIA TECH", and "the University." Through the years, the University has kept to the letter and spirit of the Morrill Land-Grant Act. Instruction is now offered in seven academic colleges and approximately fifty departments on the undergraduate level. Master's degrees in approximately 60 fields and doctoral degrees in approximately 40 fields are offered through the Graduate School.

The purpose of the University is to provide the intellectual atmosphere, the scholarly guidance, and the modern facilities for the education of men and women of the Commonwealth, the region, and the nation. Through a balanced program of resident and off-campus instruction, extension activities, and research, its scope of activities anticipates and helps to fulfill the intellectual needs of the state and the nation.

The governing body of the University is the Board of Visitors, composed of 13 members appointed by the Governor of the Commonwealth of Virginia for overlapping 4-year terms, and the President of the Board of Agriculture and Commerce, who is an ex-officio member. A rector, vice-rector and clerk are elected by the membership. The Board meets quarterly to consider policy matters and to review the progress of the University.

The President, the chief executive officer of the University is selected by the Board of Visitors and holds office without term, subject to the pleasure of the Board. The President is charged with the overall organization and supervision of the University and all of the state agencies, services and regulatory activities which have been placed under his supervision by the Board of

Visitors. The University Provost, Vice President for Administration, Vice President for Student Affairs, Vice President of Finance, Executive Assistant to the President, Director of the Athletic Association, Director of Alumni Affairs, Director of Information and Public Relations and Director of Institutional Research, report to the President. The directors and executive officers of the individual agencies, services and regulatory activities report directly to the University Provost or vice presidents under whom the President has placed each organization.

1.2 Systems Development Department

The Systems Development Department is responsible for the design, development, and implementation of administrative data-processing systems for the University, but not the day-to-day operation of systems once they are developed and turned over to the appropriate administrative office. The Department also provides the University with a "data administration" service, which performs the various housekeeping tasks associated with large and shared data bases. It monitors their integrity, reports their availability, and enforces security.

The Systems Development Department was organized in 1969 as a unit of the Computing Center. By October 1973, the scope of activities has increased to the extent that the Systems Development group was given departmental status reporting to the Vice President for Administration, a director was appointed, and the Department was given an independent budget allocation. At present, the Department consists of 18 full-time staff, one graduate assistant, a research associate, and a director.

Leadership is provided by the Director of Systems Development and two supervisors, and work is divided into projects with designated project managers. Decisions are made by the Director, several committees, and project managers. Because decisions often involve administrative units for which work is performed, the Department works closely with its clients.

1.3 Library

The Circulation and Finding System (CFS) influences several library operations and services. Specifically, it serves the interests of the Circulation, Reference, and Cataloging Departments. The Library itself holds more than 1.2 million cataloged volumes distributed over 600,000 book titles and more

than 48,000 periodical and other serial titles. The library also holds over 1.8 million pieces of microform materials. Collection strengths are in the areas of Engineering, Architecture, and the Agricultural Sciences. The Circulation and Finding System is administered and maintained by the Planning and Research group in the Director's Office of the Library.

2. Executive Overview

This report describes a system combining library inventory control (circulation) with catalog access (finding). The system runs on off-the-shelf, mass produced, hardware. Software is user adjustable and amenable to change as desired. COBOL and vendor supplied and maintained data base management system are used throughout to enhance program development and maintenance.

2.1 History

The Virginia Tech Circulation and Finding System (CFS) was developed to meet needs generated by very rapid library growth. First, circulation transactions had been increasing at about 10% annually for the previous decade and were straining the manually maintained circulation files beyond acceptable limits. Second, in recognition of increased library utilization and collection growth, a 100,000 square foot addition to the library was planned and approved. Because Virginia Tech's library has only one card catalog it became evident that some means should be found to disperse catalog information throughout a facility which will have doubled its size upon completion of the addition. After reviewing the alternatives to disperse the catalog - e.g. build a duplicate card catalog, photographically reproduce the catalog, or develop a COM catalog - it was decided to attack both problems, circulation control and catalog dispersal, within a single system, the Circulation and Finding System.

2.2 History/System Objectives

The primary goals of the Circulation and Finding System (CFS) were: 1) to enhance accountability of borrowers for items checked out and also to enhance the Library's accountability for state property (i.e. the collection) through a rigorous circulation control and usage information system; and 2) to aid users in accessing needed works from remote locations thereby better amortizing the investment in the collection. These goals lead to the following system objectives:

1. The system should be computer based so as to maximize record accuracy and contain the rate of personnel growth by virtue of a machine's somewhat "elastic" processing power.
2. The system should provide round-the-clock service and be as responsive to inquiries as possible - i.e. it should provide online processing.
3. The system should be "open" so that changes in operation or additional functions could be easily added to allow for system growth.
4. System data base layout and access methods should be generalized so that the system could be easily

transferred to more cost effective systems should they emerge.

5. The system should conserve human resources as much as possible - even at the expense of less than ideal mass storage efficiency or CPU economy.
6. The system should have provisions for securing data against the possibility of catastrophic failure of mass storage.
7. The system should be based on standard components and software products so as to utilize economies of scale due to national marketing patterns and not a small sub-component such as EDP equipment developed exclusively for libraries.

These objectives ruled out many possible alternatives. Objective 1, computer processing, clearly ruled out manual processing. Objective 2, round-the-clock online service, ruled out running on the University's central computer because of the great cost involved in keeping its data base management system up 102 hours/week. Objective 3, open system, ruled out all turnkey systems available in 1975 when these objectives were articulated. Having eliminated three possible ways of implementing activity to support these objectives, the task was to assure that objectives 4 through 7 could be met by some technology within a finite budget. This assurance came about by matching detailed specifications with extant computer technology, and our choice was to utilize a Hewlett/Packard 3000 minicomputer.

2.3 Major Functions

Table 4.1 is a summary of the CFS on-line circulation transactions. Table 4.2 gives the online finding transactions. A few of the more frequently used batch jobs are summarized in table 4.3. Another set of online transactions used for data entry are not shown.

2.3.1 Circulation Procedures

All efforts have been made to use the system in a humanized fashion. One implication of this statement is that the system is never allowed to make decisions better made by responsible staff. This principle led to establishment of two kinds of circulation stations residing side-by-side. The first is staffed by students who typically work a 10-to-20 hour week. Largely because of pressures involved in pursuing studies, staff in this personnel slot historically have shown a good deal of turnover. Correspondingly, circulation stations staffed by students only deal with heavily used but nondiscretionary transactions: CKOT (check-out), CKIN (check-in), RNEW (renewal), CHOR (check-out of specific recalled or held item) and PTRN (what items does a patron have charged out). (See Table 4.1) Should any questions

or problems arise, as can be the case when performing the check-out routine and the system informs the operator that the borrower owes unpaid fines or has overdue materials, the borrower is directed to the adjacent station staffed by a full-time employee. This latter station - call it the trouble shooting station - is staffed by people who can articulate circulation policy to borrowers and make decisions with regard to any questions concerning fines, lost books, or reinstatement of invalidated or blocked privileges. Both types of stations, of course, have access to the same circulation transactions and, depending on how brisk circulation traffic is, the four terminals can interchange roles. In very light periods trouble shooting and standard circulation procedures can be combined at one station. In very heavy periods it is possible to have three "standard" terminals and one trouble shooting terminal.

It is useful to look at how the system works from the perspective of a borrower. To begin with, probably 80% of the books are already in the system and have bar code labels on the upper left outside of their front covers. In order to borrow books that have no bar codes, the borrower writes down the call numbers on call number slips and proceeds to the "standard" transaction desk. The borrower presents his card to the operator who - under the CKOT transaction - reads in the borrower's identification from the bar code label on the card. As a check the system repeats the borrower's initials to ensure the correct bar code label had been put on the card. (See Figure 4.1) The books with the ten digit bar code labels are now read by a light pen. The system now associates the patron and book numbers.

For books not already in the system the operator uses duplicate bar code labels - the first ten digit label is placed on the book and the second on the call number slip the borrower had just filled out. The newly labeled book is read in as before and association is made as before between item number and patron number. At this stage the association however lacks title, author and call number. Within hours the data entry group, using the call number slip, will associate the bar coded slip with the appropriate catalog card and add the call number, author, title and other information against the same item number record in the system. In this way a "core" of heavily circulating titles has been identified during two years of operation. It has been found, for the VPI&SU Library, that after 2 years operation the chances are 80% that items to be checked out are entered in the system. Alternatively, 33% of the collection accounts for 80% of the circulation.

Frequently the borrower wants to pick up a book that had been recalled from another borrower at his request. He would give an operator the postcard sent him when the recalled book was returned and checked in. The check-in transaction, CKIN, itself had alerted the operator that this item should be set aside for the "recalling" borrower. (Figure 4.2). Next, the operator goes to the recall shelf and pulls the appropriate book by matching

recall notice numbers on card and book. Next, using COHR (the transaction for checking out Holds and Recalls), the operator checks out the recalled title to the requestor. Unless overridden, the system would not allow anyone other than the first person who placed the recall to check out the book.

The borrower now goes his way and the operator, while waiting for other borrowers, checks in books that were returned to the return bin using CKIN.

We have found relatively few items are overdue. One reason is that borrowers are encouraged to phone, mail, or bring in materials for renewal. All that is needed is the ten digit number on the bar code label. Frequently borrowers want everything renewed and there is a blanket renewal routine - run in batch mode - which performs this task. Figure 4.3 shows the online renewal screen dialogs and Figure 4.4 shows the notice which is sent to the borrower as a receipt after a blanket renewal. Note in both cases there are items blocked due to the presence of holds or recalls.

As indicated above, the system allows easy claiming of needed materials through the HOLD and RECL transactions. Material not returned is tracked through a series of overdue messages and bills as shown in Fig. 4.5.

In response to a variety of problems, the system blocks patrons from further circulation. For example, if a recall has been ignored, printing of the final recall notice will change the patron's circulation code to 00 (for outstanding material) and not allow that borrower further circulations until the problem has been resolved. Another example where the system uses blocks is when problems with the borrower's address have been detected - usually because overdue notices were returned in the mail.

2.3.2 Data Entry Procedures

Shortly after a book has been bar coded the bibliographic records for that title and that piece need be entered into the system. This is accomplished by associating a catalog card with the call number written on the call number slip that had been filled out when the item circulated. In order to allow for first time circulations of titles "unknown" to CPS, use is made of dummy records filled with default information. Using the BIBM transaction (bibliographic modify) the title specific fields are upgraded from the default values. Next the piece specific fields are upgraded using the ITMM (item modify) transactions.

New acquisitions and retrospective titles are added to the system using the BIBB (bibliographic enter) and ITME (item enter) transactions. Should a given title have several pieces associated with it, only one bibliographic record is entered - all item records associated with that title are automatically linked to the single bibliographic record as the data entry

operator keys the call number for a given piece. This linking results in economies in mass storage, data entry effort and, for searching, conveniently brings together all copies and editions of a given title. Recently developed programs which convert MARC records to the CFS format are expected to reduce the amount of manual data entry work considerably.

Needless to say, much of effort has been spent in the development of the rules of transcription from catalog card to CFS record. A key point governing the data conversion effort is that CFS and the card catalog are kept rigorously consistent.

Serials deserve special discussion. In broad perspective the recurrent problem of gaps in a serial title due to volumes being in transit to or "overdue" from the bindery form an aspect of the circulation and access problem. Because periodicals do not circulate, individual volumes have not been labeled with bar codes. The principle adopted was to make use of a bibliographic notes field so as to describe general statements true for all items belonging to a given title. Bindery control, title linking of serial continuations, and holdings are recorded at this level. Figure 4.6 shows a serial record which demonstrates these features. "Overdue" bindery reports are generated through use of a batch program which compares the expected return date with a reference date range input by the operator.

2.3.3 Reference Procedures

As noted earlier a major system objective was the ability to disperse the catalog. While the CFS record format is very simple compared to the full MARC record (Ref. 1), it, nevertheless, is a highly utilitarian record capable of answering many questions formerly the sole purview of the card catalog. An added dimension in effectiveness comes about through coupling the catalog surrogate with online circulation records. In short, while it is very valuable to know from afar that the library holds Preston's Nuclear Physics, it's much more valuable to know in one look up that copy 1 is due back next week and copies 2 and 3 are available at the reserve desk.

Inquiry is by three basic online transactions - ITMQ (item query), CALQ (call number query) and ATDQ (author-title query). (See Table 4.2) Item query is primarily used by circulation and data entry staff to verify the status or description of a given piece and consequently will not be discussed further here.

Call number query (CALQ) displays the status of all items associated with the title specific portion of the call number. All copies, editions, or, as appropriate, volumes of a given title as well as holds and recalls are displayed. Assume that a reader goes to the shelf and does not find the desired title. Use of CALQ will allow the reader very easily to plan to gain access as soon as one of the copies or editions of the needed title is returned through use of the HOLD or RECALL transactions.

If the earliest anticipated date of return is too far in the future, then the reader knows immediately to change plans and use an alternative title.

As indicated before, the author-title query (ATDQ) is really three searches combined into one transaction. To conduct an author search one simply enters the author's name and responds with a question mark to the query "title?". (Figure 4.7). A similar procedure applies for title searching. And, of course, the intersection of author "hits" and title "hits" is found by filling in both the author and title prompts. Reference librarians use the ATDQ transaction to save time consuming trips to the card catalog and, at the same time, definitively determine the status of the desired title. Should a given title be unavailable, it is often profitable to display all that author's works (using ? in response to the query "Author?") and recommend an alternative title.

Management reports based on circulation occurrences form an important aid to collection development. While management report programs are scheduled for completion in the next phase of the system's evolution, one very simple report has captured the fancy of many reference personnel. This report allows a collection development librarian to specify a range of call numbers in their area of interest and a range of circulation occurrences for books in the call number range. The report selects from the data base all titles that fall in the call number range and that meet the circulation occurrence criteria, counting all circulations of all copies or volumes of a title. For example, the librarian responsible for mathematics and computer science could request titles between QA1 and QA999 that had circulated more than seven times. This report would select heavy use titles, even in cases where there are four copies that each only circulated twice. This type of report, tailored to the needs of an individual reference librarian, can help make the library more responsive to the needs of the users.

2.3.4 Administration

Fundamental to the development of the system is the principle of transfer of responsibility and authority from the design and development group to the user group as various phases of system development are completed. (Ref. 2) Such a turnover of authority means that the library also assumes the responsibility of maintaining system code and documentation as the project's planned phases are completed. From the point of view of the design and development group, they avoid becoming bogged down in a mire of never ending requests for changes, improvements, and add-ons. The library, if it is wise, will steer clear of that same patch of quicksand by sticking to its guns and being content through practice of the often overlooked art of code maintenance against minor changes - such as those involved in writing new batch reports, or altering screen displays. Substantive changes are best deferred to a new phase of the system's development.

System changes are thus frozen by mutual agreement at the completion of each phase.

Internal to the library, the systems group temporarily assumes line authority over all operating units in so far as system usage is concerned. After procedures have been proven or altered - frequently through a re-casting of a portion of code - operational authority is transferred back to the line operations. Departmental manuals of procedure provide the basis on which all involved can review each other's intended use of the system and at a formal internal turnover meeting voice any concerns or objections. It is necessary to obtain interdepartmental agreement because the system cuts across traditional organizational boundaries.

2.3.5 Continuing Developments

As has been noted, the routine use of maintenance of any computer based system will inevitably suggest new features and products to those responsible for the system's well-being. On the one hand, these possibilities may tempt one to tinker endlessly with the system and to produce a patchwork product understood by no one and full of inconsistencies. On the other hand, the undesirability of a totally static system was the main argument against purchase of a commercial turnkey system for the library's circulation functions.

Virginia Tech's response to this paradox has been first to freeze the first phase of the system during a shake down period and then carefully to weigh the proposed new features and to introduce them in a sequence which replicates in part the procedures by which the original specifications for the system were written. Systems Development works together with the Library to determine what features are truly needed and to design an integrated and planned response to these new needs. Two such sequences or development phases are currently underway. They have different purposes and are in different stages of realization.

2.3.5.1 Phase Two: Management Reports

It is obvious that the central asset which makes any library a useful resource is its collection of books and other materials. One of the most difficult and most important tasks of the library staff is to use the limited resources available for purchasing materials so as to guarantee that the right materials in the right quantity are available for use. Because the use of library materials follows consistent patterns, this can be done. To do it--to build a collection in a way which anticipates and adjusts to user needs--requires that the library make intelligent use of all the information it has about how the collection is being used.

Put briefly, the second phase of the CFS' development consists of an effort to take advantage of the wealth of information about

collections use which is a by product of an automated circulation system. What categories of books are being used? Which individual titles are in such high demand that additional copies are required? Where can we cut back to save resources we need elsewhere? Questions of this nature go to the heart of collection-building and they are just the kinds of questions which an automated system can help to answer.

Collection development at the Virginia Tech library is decentralized and broad-based, with about twenty librarians responsible for the identification of needed materials within their areas of subject expertise. To make circulation statistics useful to such a large number of persons requires that the management statistics provided by the system come in a highly accessible and intelligible format. The modifications of the system which comprise Phase II have therefore been designed with several goals in mind: they must provide the most salient measures of collections use; they must do so in a way which uses available resources and requires no fundamental recasting of the data base; and they must be compact and clear.

In designing Phase II of the CFS, the library has identified the summary statistics most useful to them in monitoring use of the collection and adjusting the purchase of materials to provide what is needed. Meetings with Systems Development staff allowed the professionals to modify their requests, consolidating some of the desired products and making compromises when called for. The Systems Development staff has taken the new specifications developed in this cooperative process and is now writing the computer code to implement them. The resulting reports will tell us what sort of borrower is using the system, what materials they are using most heavily, and how well our dollars are being apportioned to meet our users' demands.

2.3.5.2 Phase Three: Folding in Serials

As the library staff has used the CFS and come to accept it as a standard working tool, both its strengths and its limitations have become increasingly obvious. The system operates magnificently to track the circulation of monographic publications and in doing so it eliminates the need for the unwieldy, volatile, error-inviting, and redundant files which characterize manual circulation systems. Probably one reason the collection is more heavily used now is because it is easier to use.

There is another problem area which the system plans to address and this lies in what is known as serials control. Serial publications are very important to research libraries because this class of literature is made up of scholarly journals, the proceedings of standing conferences and symposia, etc. Further, tight control of serials is an important ingredient in the effective management of a research library because every time a subscription is initiated there is a "mortgage" placed against

future purchasing dollars.

Present serials control involves a plethora of computer-based and manual files. Redundant files for bibliographic information, for locating bound volumes, for check-in and location of unbound issues, for identifying serial titles throughout the region, and for a host of other purposes proliferate. Each of these files requires steady maintenance and updating by separate parts of the staff scattered throughout the library.

Recently, a number of concurrent developments have taken place. First, since the CFS became operational, the costs of computer storage have dropped by a factor of four. Second, the library recently joined the Ohio College Library Center (OCLC), a nationwide pooling of cataloging information which allows libraries to exchange data in standard machine readable format and to minimize duplicate cataloging. Finally, in the remote background, national efforts to establish standard formats for bibliographic and holdings information in machine readable form have continued their steady progress. While our principal efforts have been properly focused on maintenance of our up-and-running system, we would be remiss if we ignored these significant developments in making our future plans.

Phase III of CFS development may be described as an effort to deal with the library's recognized problems with serial publications in a manner which takes advantage of the recent developments outlined above and preserves future opportunities to enlarge our exploitation of professional and technological advances. Beginning in February of 1979 librarians responsible for serials functions and for library planning have met to outline requirements for a comprehensive serials management system (SMS) which will extend the present capabilities of the CFS. Our goal is to couple bibliographic records in the standard MARC format with information about our holdings (also in standard formats) and with ordering, claiming, and payment information which relates to the acquisition of materials. By integrating financial accounts, bibliographic data, and holdings information for each serial title held by the library, we plan to eliminate the most burdensome of the library's manual files and to provide a single "lookup" for serials information.

Planning for Phase III is well underway. A design group has outlined the new specifications in broad terms and has delegated the task of refining these specifications to a series of working groups. These groups are writing requirements for how the system shall be accessed and for how information will be stored, updated, and displayed. In specifying the data formats, we have required that they conform to available national standards. This will permit a straight forward introduction of our OCLC data into the system and will facilitate long-range cooperative projects whereby we will make our records available to other libraries and will also be able to fold in data from other institutions as needed.

We are now to a point where the Systems Development staff has begun to participate in planning, sharing their expertise to keep our requirements realistic and to insure that the revised system is fully compatible with automated systems already in place. Besides compatibility with OCLC and with national formats, this requirement for compatibility means that the revised system must replicate some accounting functions currently performed by a somewhat outdated library acquisitions system and must, above all, remain internally consistent in that procedures and data from the old and new portions of the overall system can maintain a smooth interface. We are acutely aware of the need to have one system and not a potpourri of systems masquerading as a whole on the pretext that they run off the same computer.

We believe that by making serials the focus of our current activity we have done our utmost to insure an organic growth for the system. We have seen too many library systems which were designed to accommodate monographic materials and which fell apart when the vastly more complex records associated with serials were forced in as an afterthought. By defining serials as the key problem fairly early in the game, we believe that we are at once tackling our gravest problems and creating a system which will be able to deal with all manner of library records.

3. File Descriptions

Essential to the development of any system is the choice of distinct data elements or fields. CFS data elements can be divided into four basic groups - bibliographic, item, borrower, and circulation control. Bibliographic data elements support the title specific entries in the data base and include fields for title, author, title and author access keys, and class number. Associated with most bibliographic records are one or more item records. The fields forming item records are piece specific and include piece identification number, price, publisher, shelving location, maximum circulation period, etc. Borrower data sets are made up of elements such as borrower identification number, maximum circulation entitlement period, name and initials, and so forth. Circulation control data elements include due date, checkout date, overdue notice count, recall notice count, and so forth.

In outline, the bibliographic and item data groups are linked together by the data entry operation. Thus a given title has associated with it one to several pieces representing different copies, volumes, or editions of a given title. Bibliographic records are allowed to exist without being linked to any item records - a feature which was profitably exploited in entering non-circulating periodicals into the system. (Fig. 4.6)

Borrower data is largely drawn from personnel and student data bases maintained by the university. However, there is provision for entry to the borrower data sets of the 10% of users not directly associated with the university. Finally, the circulation control data elements link the borrower data with the bibliographic/item data elements.

Space does not permit more detailed description of the many files involved. Further information can be found in the Detailed Documentation. (Ref. 3) Table 3.1, a listing taken from the Detailed Documentation gives an overview of the files used.

Table 3.1

LIBRY
LIST OF DATA ITEMS

ITEM	LENGTH	DESCRIPTION	DATA SETS USED
AUTHKEY	6	Author Last Name Key	AUTHMAST, BIBRAPHY
AUTHOR-NAME	24	Author Name	BIBRAPHY
BIBRAPHY-NOTES	40	Bibliographic Notes	BIBNOTES
CALL-NUMBER	24	Call Number	CALLMAST, BIBRAPHY, BIBNOTES, ITEMDETL, HPMASTCI, HLRCDETL
CALL-NUMB-NOTE	26	Call number for Biblio. notes	BIBNOTES
CHECK-OUT-DATE	5	Date checked out	CIRCODETL
CIRC-COUNT	4	Checkout count	ITEMDETL
CIRC-DAYS	4	Item loan Period	ITEMDETL
CIRC-PERIOD	2	Patron circulation code	CIRCCODE, PTRNMAST
CIRC-PER-COUNT	7	Total circulation by type	CIRCCODE
CITY-STATE-ZIP	24	For non-University patrons	NONUDETL
DATE-LAST-NEED	5	For hold/recall cancel	HLRCDETL
DATE-PLACED	5	For hold/recalls	HLRCDETL
DATE-SENT	5	Date recall sent	RECLSENT
DELINQUENCY	2	Patron delinquency status	PTRNMAST
DUE-DATE	5	Date item is due for return	CIRCODETL, FINEDETL
FORMAT	2	Bound, microfilm etc.	ITEMDETL
H-R-TYPE	2	Hold (H) or recall (R)	HLRCDETL
HOLDING-DATA	40	Additional Item Information	HOLDDETL
ITEM-ID	9	Unique item ID number	ITEMMAST, RECLSENT, ITEMDETL, SUBCMASST, HLRCDETL, CIRCODETL, FINEDETL, HRMASTII,
ITEM-ID-NOTE	12	Item # for additional info	HOLDDETL
ITEM-PRICE	9	Item original cost	ITEMDETL
LIB-OF-CONG	12	Library of Congress/ISBN	ITEMDETL
LOCATION	2	Item shelf location	ITEMDETL
NOTICE-ID	9	Hold/recall notice number	HLRCDETL
NOTICE-COUNT	4	Number of overdue notices sent	CIRCODETL
OTHER	4	Item detail special codes	ITEMDETL
PATRON-ID	9	Unique patron ID number	PTRNMAST, CIRCODETL, FINEDETL, NONUDETL, HLRCDETL
PATRON-ADDR	30	Street address	NONUDETL
PATRON-INITIALS	4	Patron initials	PTRNMAST
PATRON-NAME	20	Patron name	NONUDETL
PATRON-TYPE	2	Category of patron	PTRNMAST
PERIOD-DAYS	4	Days for circ-period code	CIRCCODE
PUB-ID	9	Publisher ID number	PUBLMAST, ITEMDETL
PUB-DATE	4	Publication date (year)	ITEMDETL
PUB-NAME	30	Publisher name	PUBLMAST
RECALL-TYPE	2	Type of recall sent	RECLSENT
RENEW-FLAG	2	Flag indicating renewal	CIRCODETL
RETURN-DATE	5	Date item was returned	FINEDETL
SPECIAL-CODES	6	Bibliographic codes	BIBRAPHY
SUB-CALL	20	Call number extension	SUBCMASST
SHORT-TITLE	60	Short title	BIBRAPHY
TITLEKEY	6	Title key	TITLMAST, BIBRAPHY

Table 3.1 (con't)

TITLEKEY1 2
TITLEKEY2 2

BIBGRAPHY
BIBGRAPHY

ADDRS

LIST OF DATA ITEMS

<u>ITEM</u>	<u>LENGTH</u>	<u>DESCRIPTION</u>	<u>DATA SETS USED</u>
CITY	18	City	PTRNADDR
NAME-FIRST	2	First initial	PTRNADDR
NAME-LAST	12	Last name	PTRNADDR
NAME-MID	2	Middle initial	PTRNADDR
PATRON-ID	9	Unique Patron ID number	PTRNADDR
STATE	2	State abbreviation	PTRNADDR
STREET	22	Street	PTRNADDR
ZIP	6	Zip code	PTRNADDR

CSTAT

LIST OF DATA ITEMS

<u>ITEM</u>	<u>LENGTH</u>	<u>DESCRIPTION</u>	<u>DATA SETS USED</u>
PAT-TYPE-DAY	8	Patron type day	CIRCSTAT
TYPE-COUNT	9	Total count for day	CIRCSTAT

4. System Inputs and Outputs The following pages show screen displays and operator responses for selected online transactions. A small sample of batch reports is also shown. The dot (.) before a line indicates the operator's response to a system prompt.

- CKOT
- ENTER PATRON NUMBER FOR CHECKOUT
- 2153305424
- INITIALS: ARP
- PATRON HAS OVERDUE ITEMS AND OWES FINES--SHOULD CLEAR RECORD
- DO YOU WISH TO ALLOW PATRON TO CHECK OUT ITEMS?
- Y
- ENTER ITEM NUMBER FOR CHECKOUT
- 1000089144
- CHECKOUT COMPLETED TO PATRON # 2153305424 DUE-DATE: 12/24/78
- ENTER ITEM NUMBER FOR CHECKOUT
- 1000300946
- ALREADY CHECKED OUT--MUST BE CHECKED IN FIRST
- ENTER ITEM NUMBER FOR CHECKOUT
- 1000164270
- HOLD # J333 ON ITEM #
- THIS PATRON DID NOT REQUEST THE HOLD/RECALL
- DO YOU WISH TO OVERRIDE?
- N
- ENTER ITEM NUMBER FOR CHECKOUT
- 1000204816
- CHECKOUT COMPLETED TO PATRON # 2153305424 DUE-DATE: 12/24/78
- ENTER ITEM NUMBER FOR CHECKOUT
- 1000204813
- CHECKOUT COMPLETED TO PATRON # 2153305424 DUE-DATE: 12/24/78
- ENTER ITEM NUMBER FOR CHECKOUT
- EXIT
- ENTER PATRON NUMBER FOR CHECKOUT
- EXIT
- ENTER TRANSACTION CODE OR 'HELP'

Figure 4.1 Check out (CKOT). Note that operator is alerted to borrower's fine status. Further, system blocks circulation of book held for another borrower.

● CKIN

ENTER ITEM NUMBER FOR CHECKIN

● 1000110120

CHECKIN COMPLETED

ENTER ITEM NUMBER FOR CHECKIN

● 1000165536

RECALL # 1234 ON CALL #

HAVE YOU PLACED THE ITEM ON THE PROPER SHELF?

● Y

CHECKIN COMPLETED

ENTER ITEM NUMBER FOR CHECKIN

● 1000212364

ITEM IS OVERDUE

PATRON # 2153305424--OVERDUE CHARGE: \$7.70

IS PATRON PRESENT AND ABLE TO PAY FINE?

● Y

CHECKIN COMPLETED

ENTER ITEM NUMBER FOR CHECKIN

Figure 4.2 Check in (CKIN). Note that operator is immediately alerted to hold. Fine is also detected and, because borrower was present, cleared on the spot.

● RNEW

ENTER ITEM NUMBER FOR RENEWAL

● 1000198463

RENEWAL COMPLETED TO PATRON # 2225114982 DUE-DATE: 10/25/78

ENTER ITEM NUMBER FOR RENEWAL

● 1000232217

HOLD # 4567 ON ITEM #

ITEM CANNOT BE RENEWED

ENTER ITEM NUMBER FOR RENEWAL

Figure 4.3 Renewal (RNEW). All that is needed is barcode label number. Again system traps material held for others.

UNIVERSITY LIBRARIES
VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
BLACKSBURG, VIRGINIA 24061

09/27/78

A R PIERCE
LIBRARY
CAMPUS

DEAR LIBRARY PATRON :

AS YOU REQUESTED, THE FOLLOWING BOOKS CHECKED OUT IN YOUR
NAME HAVE BEEN RENEWED:

CALL NO	TITLE	NEW DATE DUE
ND31 B369943	EFFICIENT ORGANIZATIO	12/26/78
ND31 D773 1974 C.4	MANAGEMENT: TASKS, RE	12/26/78
2675 U5 Y68 1976	PLANNING, PROGRAMMING	12/26/78
2678 .B5 N37 1975	EVALUATION AND SCIENT	12/26/78
PR6011 D58 P3	PASSAGE TO INDIA.	12/26/78
HC59 K32 C.2	NEXT 200 YEARS : A SC	12/26/78
P27 U6461 LI2 JUV C.2	LITTLE HOUSE IN THE B	12/26/78
2678 L496	LIBRARY PLANNING AND	12/26/78
PR6011 D58 R7 1943	ROOM WITH A VIEW.	12/26/78
PS3554 E4425 R3	RATHER'S STAR.	12/26/78
NJ757 P4	FEDERAL TAX POLICY.	12/26/78
2696 M3	CLASSIFICATION IN THE	12/26/78
PR9199.3 M3 P7	PRICE OF GOLD.	12/26/78
P23 C27405 FAT C.2	FATHER : AND OTHER ST	12/26/78

YOUR LOANS OF THE FOLLOWING ITEMS CAN NOT BE EXTENDED BECAUSE
THEY HAVE BEEN REQUESTED BY ANOTHER BORROWER OR ARE NEEDED
BACK IN THE LIBRARY FOR A BRIEF TIME TO ADJUST CATALOGING RECORDS:

CALL NO	TITLE	DUE DATE
BP130 C73	HIND. OF THE QUR'AN; C	12/24/78

PLEASE RETURN THESE BOOKS AS SOON AS POSSIBLE. IF YOU HAVE
ANY QUESTIONS PLEASE CALL 951-6340.

THANK YOU,

CIRCULATION DIVISION
USER SERVICES DEPT.
CAROL M. NEWMAN LIBRARY

Figure 4.4 - Blanket Renewal Notification



VIRGINIA POLYTECHNIC INSTITUTE
AND STATE UNIVERSITY
UNIVERSITY LIBRARIES
BLACKSBURG, VA. 24061

↓ TO OPEN PEEL BACK THIS PART ↓

LIB	CALL NUMBER	AUTHOR	TITLE	STATUS	DATE DUE	FINE
	RC514 C46 RC574 M3	CHAPMAN, LO MCGHIE, AND	DISORDERED THOUGHT IN S ANTHOLOGY OF ATTENTION.	1ST ODUE 2ND ODUE	04/04/78 03/20/78	.40 1.90

CALL 951-6340 TO RENEW LOANS
AND OBTAIN A PRINTOUT OF OUR
RECORDS OF YOUR ACCOUNT. 4/6

A. R. PIERCE
LIBRARY
CAMPUS

21

Figure 4.5 - Overdue Notice

CALL #: BF1 A5
 AUTHOR: NONE
 TITLE: AMERICAN JOURNAL OF PSYCHOLOGY.
 NOTES:

LIBRARY HAS: V.1-89, 1887-DEC. 1976,
 CURRENTLY RECEIVED. FILM, V.79-90,
 MAR. 1966-DEC. 1977. C.2 RESTON, V.73-
 91, 1960-1977.
 ISSN 0002-9556
 CHEDS, V.1-72.
 MBR 8/75.
 10/09/78 BINDERY V.90

NO. --ITEM ID- ----- CALL NUMBER ----- SUB-CALL ----- DATE STATUS

Figure 4.6 Serial Record. Detailed holdings of bound volumes are shown. The notation "CHEDS" refers to an off-site storage facility for older serials holdings. Note V.90 is "due back" from the binder 9 Oct 1978.

● ATDQ
 FOR AUTHOR/TITLE SEARCH:
 ENTER AUTHOR'S NAME
 ● DEBACH,
 ENTER TITLE
 BIOLOGICAL CONTROL OF INSECT PESTS AND WEEDS
 NO. CALL NUMBER: AUTHOR: TITLE:
 1. SB975 D4 DEBACH, PAUL. BIOLOGICAL CONTROL OF INSECT P
 END OF SEARCH
 (ENTER LINE # FOR ATDQ CALL # SELECTION OR 0 TO CONTINUE/EXIT)
 ● 1

CALL #: SB975 D4
 AUTHOR: DEBACH, PAUL.
 TITLE: BIOLOGICAL CONTROL OF INSECT PESTS AND WEEDS.
 NOTES:

(NONE)

NO.	ITEM ID	CALL NUMBER	SUB-CALL	DATE	STATUS
1.	1000002186	SB975 D4		1964	
2.	1000035518	SB975 D4	C.2	1964	INCIRC
3.	1000043494	SB975 D4	C.5	1964	RV
4.	1000071697	SB975 D4	C.3	1964	
5.	1000097065	SB975 D4	C.4	1964	

END OF SEARCH
 (ENTER LINE # FOR DETAIL ITEM DATA OR 0 TO EXIT)

Figure 4.7 Author/Title Search (ATDQ). Presently there are five copies of the above publication. For the case shown, copy 2 is in circulation (status=INCIRC) and copy 3 is in reserve (status=RV). The other copies are available to the user.

Table 4.1 Online Circulation Transactions

Transaction Code	Function
CKIN	Check-in.
CKOT	Check-out
CKOD	Check-out with date override. Used for special permission circulation of reference materials or for extended period loans.
COHR	Check-out of recalled item. Ensures proper match between item and borrower who placed recall.
RNEW	Renewal.
HOLD	Places hold against call number (so that any of several copies will be trapped upon check-in or check-out) or against specific item number.
RECL	Prints note to borrower requesting return of item for use by another borrower or reserve collection. A bill for non-return is printed 30 days after first recall notice was sent. RECL has date aging feature as does the HOLD transaction.
HRDEL	Hold-recall delete. Kills hold or recall if no longer needed.
PTRN	Patron check. Lists titles, authors, and call numbers of all items charged to borrower. Provides receipt which, when run on printing terminal, is mailed to borrower upon request.
ITEM	Item check. Shows profile of a particular item, including any current holds or recalls.
CNCK	Call number check. Shows check-out profile of all items associated with a given call number, e. g. all copies in circulation.
HRIQ	Hold/recall inquiry. Shows all holds and recalls for a given call number.
PTCR	Patron clear. Clears borrower's unpaid fine record.

SECK	Security check. Used at exit control to verify that bar-coded items are charged out.
GRACE	Grace days. Rolls back clock for check-ins so as to ignore items made overdue because library was closed, etc.
PTRE	Patron enter. Used to enter new borrower into CFS.
PTRM	Patron modify. Used to change patron data.
PTRD	Patron delete. As appropriate, used to delete borrower's record from data base.

Table 4.2 Online Finding Transactions

Transaction Code	Function
CALQ	Call number query. Displays all items belonging to a given call number. Thus a query on QA76.8 P2 E26 (Minicomputer Systems) will display the status of the three copies for this title.
ATDQ	Author - title query. Allows searcher access by author only, by title only, or by author-title combination. The title search is based on a 3,2,1 key for the first level match. For titles longer three words the searcher may add words four and/or five and search titles against 3,2,1,2,2 key. The ATDQ transaction builds the search key from words the searcher keys in and thus isolates users from any possible future changes in key design. Author searching is based on direct match of the first six characters of the first word of the author entry. Should the searcher indicate additional characters - Lee, John A. N. as opposed to Lee, J - the author query would scan all the records retrieved against the key "LEEJNN", rejecting those that do not match the "JOHN A. N." string. Simultaneous use of the author and title access points yields only those titles that match both specifications. (see Fig. 4.7)
ITMQ	Item query. Displays full record for given item number.

Table 4.3 Selected Batch Jobs

Job Stream	Function
CPSJ910/911	Overdues. Sends pre-printed form to borrowers specifying overdue titles. (See Figure 4.5)
CPSJ915	Recall. Sends pre-printed form specifying title that has been recalled for use by another borrower.
CPSJ916	Frequently or infrequently circulated titles. Lists titles in call number order that have circulated x times. x lies within a band specified by the user (e. g. 0 - 2 for infrequent, 10 - 100 for frequent).
CPSJ935	Blanket renewal. (See Fig. 4.4)
CPSJ912	Galley proofs. Lists in call number order full records entered over specified time period.

5. Summary of Benefits

The primary benefit of the system has been the improvement in the quality of library services. Specifically we have found:

Benefit 1. Integrity of circulation control and claiming.

Benefit 2. Improved use of needed materials through convenient and reliable hold and recall functions.

Benefit 3. Reduction of lines waiting to check-out material. Reduction of uncertainty concerning books not found in stacks.

Benefit 4. Dispersal of catalog information throughout the library. (A link from Dulles Airport reserve library in Northern Virginia to Blacksburg vastly enriches the off-site facility's capability to get needed material.)

Benefit 5. Production of statistical and other management reports.

References

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3. Systems Development Department. VPI & SU. Documentation for the Library Circulation and Finding System. The Department, Blacksburg, Va. 1978. (Available in fiche format for \$5.00, in hardcopy \$25.00)